SURVEY AND REPORT
OF
PRESENT AND FUTURE LOAD REQUIREMENTS
OF
RURAL ELECTRIC COOPERATIVE,

CLEARWATER VALLEY LIGHT AND POWER ASSOCIATION
Lewiston, Idaho
(Idaho 10 Nez Perce)

APPLICATIONS AND LOANS DIVISION
RURAL ELECTRIFICATION ADMINISTRATION
WASHINGTON 25, D. C.
OCTOBER 1946

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PURPOSE OF REPORT

The purpose of this survey and report is to appraise the prospects for electric power consumption by existing and potential consumers of the Clearwater Valley Light and Power Association and to estimate the probable power requirements of this cooperative at the end of the next two, five and ten years.

The immediate purpose of the report is to ascertain present and probable future power requirements of the cooperative and resulting load data for consideration by the Bonneville Power Administration in its studies of the feasibility of extending transmission lines into the area to provide adequate low cost power to the present and future members of the cooperative as well as to other loads independent of this study.

This report does not purport to establish the feasibility of the cooperative serving all loads tabulated in the survey nor does it intend to imply that funds are or will be earmarked by the Rural Electrification Administration for service to such loads. Each application for REA load funds will, as in the past, be considered on its own merits.

Other purposes of the report are (1) to provide a foundation upon which to base a long range rate structure, (2) to furnish pertinent information in connection with a future system study to be

1/ Prepared by William G. Mills, Engineer, and F. O. Billings, Field Representative, Applications and Loans Division, REA, USDA.

prepared by the cooperative; and (3) to serve as a guide for a comprehensive power use program.

Consideration has been given to present rural industrial loads which are not now served by central station power and to those which may be expected to be served as the result of the further development of the natural resources of the area.

The attached sketch map (Drawing No. I) shows:

(1) Tentative cooperative boundaries;

(2) Existing and proposed transmission lines of other utilities;

(3) Tentative location and area to be served by each of the six proposed points of delivery;

(4) Estimated kilowatt demands and kilowatt hour consumption at each of the tentative points of delivery for Bonneville power.

SUMMARY AND CONCLUSIONS

The survey of the cooperative area reveals that a substantial potential market for electrical energy exists on the farms, in the rural villages and in industries served or to be served, by the cooperative. A considerable industrial potential market for power over and above those included in the estimates of load contained herein are expected to develop when the natural resources of the area are further developed.

The territory to be served by the cooperative covers such a large area that it will be necessary to provide multiple points of delivery of power if full use of power on the farms and for industrial development of the area is to be attained. For this reason, and because of the magnitude of the loads to be encountered in the respective areas, the load estimates are segregated as to the power requirements for each tentative point of delivery as set forth in Tables VIII to XIII, respectively.

Table XIV (Summary of Power Requirements) indicates that the cooperative will encounter a maximum demand of approximately 5,500 kilowatts in 1948, 13,000 kilowatts in 1951 and 22,000 kilowatts in 1956 1/. Likewise there will be a total annual energy requirement of approximately 16 million kilowatt hours by the end of 1948, 40 million kilowatt hours by the end of 1951 and 71 million kilowatt hours by the end of 1956.

It is further estimated that a total of 3,182 miles of 12.5 KV distribution line and 80 miles of 33 KV transmission line will

1/ In the event that all of the possible, but not reasonably assured, industrial loads develop as envisioned and described in the report, the total demand of the cooperative would reach at least 40,000 KW.

be constructed to serve 5,178 farms and rural commercial consumers, 1,161 village consumers, 110 irrigation pumps, and 111 miscellaneous commercial and large power consumers by the end of 1956. The construction of these facilities, together with the financing of necessary operating equipment, supplies and buildings will require an estimated ultimate investment on the part of the cooperative of $4,498,000.

Under the present wheeling arrangements effected as an emergency measure during the war, Bonneville power is being furnished the cooperative through facilities of the Washington Water Power Company at the Bonneville rate of approximately 3.5 mills per kwh. This arrangement will remain in force for 18 months following the official declaration of the end of the war. The failure to maintain an adequate supply of low cost power will seriously hamper the potential economic and industrial development of the area and will deprive many rural residents of the benefits of low cost power. It is, therefore, recommended that the results of this survey be made available to the Bonneville Power Administration for its consideration in the determination of the feasibility of making Bonneville power available to the cooperative over government owned facilities before the expiration of the present wheeling arrangements with Washington Water Power Company.

In the interim period, an immediate source of power is needed at points "B" and "C" (see Drawing No. 1) if the cooperative's program of area coverage is not to be seriously impaired. The Washington Water Power Company has tentatively offered the cooperative Bonneville power through its transfer agreements at the following points: (1) Three-phase power at

Orofino, (2) Three-phase power in the vicinity of Garfield, (3) Single-phase power in the vicinity of Craigmont, and (4) Single-phase power in the vicinity of Asotin. The first point of delivery "B" can temporarily be served by the installation of a Bonneville substation near Orofino to be energized from the 66 KV transmission line of the Washington Water Power Company now terminated at that point. This arrangement should be completed not later than March 1947 in order that adequate power will be available to serve industrial consumers in that area who have made application for three-phase service.

The degree of attainment of area coverage by the cooperative as well as the achievement of the estimated KWH consumption foreseen in this report will, in large measure, be dependent upon the availability of low cost power and a fully prosecuted power use program designed to attain the goals of saturation of appliances and farm equipment reflected by the estimates included in this report.

METHOD OF SURVEY AND SOURCES OF INFORMATION

The project area is large and contains a variety of conditions that bear on power requirements in the future. Agricultural, industrial and mining factors are all present and the extent of their future development will determine future power requirements. In an effort to get at all of the factors that might contribute to the development of the area and require electric power, a considerable number of people in various walks of life were interviewed. Information was obtained from the following: county agents of the counties that comprise the project area, soil conservationists, superintendents of national forests, University of Idaho and Washington State College officials, U. S. Army Engineers, Bonneville Power Administration staff members, the cooperative's manager and directors, officials of other cooperatives, businessmen in Lewiston and elsewhere, president of Inland Navigation Company, sawmill operators and local town officials.

A detailed inspection of the entire area was not made. Sections of special interest and value from a power standpoint were visited and inspected. The maps and records of the project were used in determining the location of members and prospects. Some aerial inspection was made of the Washington Water Power Company rural lines as a means of locating its rural customers.

Detail maps of the cooperative's service area showing existing and proposed cooperative lines, location of served and potential consumers, and location and size of existing and potential power loads requiring three-phase service have not been reproduced to accompany this report. However, the work maps which

were prepared to form the basis for such of the above information as has been included in the report are available in the files of the Applications and Loans Division, REA.

Much reliance was placed on the returns of the questionnaire sent to farm members of the cooperative in the spring of 1946. About 25 percent of the farm members indicated their intentions with respect to purchases of electric appliances as well as indicating appliances now in their possession. Various analyses of the returns were made in order to judge their feasibility as an indicator of future power requirements, all of which appear elsewhere in this report.

DESCRIPTION OF AREA

The project area is large. It includes all or part of eight counties in the lower end of the Idaho Panhandle and in the southeast corner of Washington. The northern part of Wallowa County in Oregon may or may not be added to the project. The Idaho Counties are Benewah, Latah, Clearwater, Nez Perce, Lewis and Shoshone. A handfull of members are in Idaho County at a point where it is inconvenient for Idaho 15 Idaho to reach them. The Washington Counties consist of the eastern edge of Whitman and all of Asotin Counties. The project area stretches out north, east and south from Lewiston, also northwest and southwest. Its extremites are as much as 125 miles from Lewiston and 125 miles from the substation at Juliaetta that now serves the entire project. It is on three general levels: river valleys and canyon bottoms, benchlands, and timbered mountains. The elevation varies from 700 feet at Lewiston to over 5,000 feet in the timbered sections. The entire area is included in the Columbia River drainage, but the subdrainage drains in different directions. The north end drains north into the Spokane River and west into the Palouse River. The large central portion drains into the Clearwater River. The southwest portion drains into the Snake River. The Clearwater joins the Snake at Lewiston. The Clearwater and Snake Rivers and their branches have during the eons of time worked their way down through thick layers of rock and have provided the area with one of its principal physical features: a large number of deep canyons. They probably average 2,000 feet in depth. Numerous county

roads and several state highways undergo a change of 2,000 feet in elevation in eight to ten miles of winding road. The agricultural land is, for the most part, located on the benchlands. That is where the large prosperous wheat and pea farms are located. The smaller less prosperous farms are generally located in the valleys and canyons. The timber is located on the higher elevations where rainfall and snowfall is adequate and where climatic conditions are not suited to agriculture.

ECONOMY OF THE AREA

Agriculture. The principal farming activity in the area is wheat and pea production. Minor activities are seed and livestock production. Dairying is on a small scale. A high percentage of farms have cows but the herds are small and are mostly for home use. Among the members who returned questionnaires only 5 percent had milking machines whereas 39 percent had cream separators. A high percentage of farms raise chickens, but they also seem to be geared to home use. The big power users are the wheat and pea farmers. There are some possibilities for irrigation in the project area and it is likely that the production of fruits and vegetables by members will increase during the forecast period. Smith's Frozen Foods of Lewiston is exerting every effort to increase the production of fresh peas, cherries, apricots, peaches, tomatoes, asparagus, raspberries and strawberries. Peas are a dry land product but the remainder are irrigated products in this section. Smith's influence is apt to lead to irrigation development which otherwise might lie dormant.

On the following page there has been tabulated basic data relating to agriculture in the principal area served by the cooperative. From this data it is seen that average farm income in 1945 in the several counties varies from approximately $1,500 in Shoshone and Clearwater Counties to $6,000 in Nez Perce County, with average farm income over the entire area being close to $4,000 per farm.

Lumbering. The timber resources of the area are very large. Potlatch Forests Inc., operates one of the nation's largest sawmills in Lewiston. Logs come from large private holdings and from the Clearwater and St. Joe National Forests. The Diamond

Basic Data Related To Farm Income And Agricultural Production By Counties In The Area Served By Idaho 10 Nez Perce /1

	Benewah Idaho	Latah Idaho	Clearwater Idaho	Nez Perce Idaho	Lewis Idaho	Shoshone Idaho	Asotin Wash.	Wallowah Oreg.	Total
Income From Farm Products (est.)	$1,774,631	7,508,961	734,481	7,182,689	4,468,176	271,970	2,528,458	3,966,027	28,435,393
Land In Farms (Acres)	160,878	374,757	108,762	550,631	243,818	22,034	352,279	675,355	2,488,514
Number of Farms	523	1,566	472	1,185	488	188	615	812	5,849
Cropland Harvested (Acres)	48,857	194,261	28,294	150,152	110,784	3,025	49,425	75,998	660,796
Crops Produced (Acres)									
Winter Wheat	9,668	48,971	3,532	55,623	36,457	2	29,058	17,080	200,391
Dry Field & Seed Peas	17,639	70,029	299	25,043	15,018	—	246	535	128,809
Barley	1,844	8,539	3,113	12,236	34,815	5	5,620	7,893	74,065
Alfalfa	4,203	21,537	5,627	11,832	4,327	575	2,658	11,722	62,481
Spring Wheat	1,337	9,235	2,914	16,068	5,435	2	3,217	6,649	44,857
Oats Threshed	4,423	20,566	3,270	4,089	2,731	52	834	3,096	39,061
Small Grain Cut For Hay	914	2,141	1,402	6,577	2,234	69	5,740	11,940	31,017
Clover Cut For Hay	5,953	2,682	3,504	633	1,381	2,031	59	3,461	19,704
Dry Field & Seed Beans	—	5,175	1,694	7,360	696	—	—	—	14,925
Other Tame Hay (ex. sorg.)	202	1,104	211	125	447	13	562	7,789	10,453
Oats cut For Feeding	820	794	1,264	1,047	2,568	166	158	690	7,507

/1 Prepared from 1945 Census of Agriculture Advance Releases Series 1 and 2

Note: Whitman County, Washington has been omitted since only the eastern edge of the County is served by the Cooperative.

Match Company and the Ohio Match Company also possess large holdings in the area, some being on private and some on government land. In addition to the largest operators there are a large number of small and medium size operators. In the table of load estimates, many sawmills are listed as definite prospects for power services. Most of the mills listed have access to timber supplies sufficient to keep them in operation for many years, some indefinitely. The principal timbered area lies along the east and north extremities of the project. A smaller area lies to the southwest in the state of Oregon. It is located partly in the Umatilla and Wallowa National Forests and partly on private land. If the cooperative's lines reach into the section, a considerable mill load will be available. One mill in this area has already requested a power rate on a load of 715 horsepower. The project is just beginning to serve the power requirements of sawmills in its service area, and in the years ahead the mill load will probably exceed the farm load.

Mining. A stratum of limerock extends in a southwest-northeast direction through the project area. Outcroppings occur at many points. A limerock crushing operation is now served by the cooperative's lines. A cement plant at Orofino, served by the Washington Water Power Company, has been closed by court order because of the damage done to personal property by the mill's effluent. The mill will move to Marshall, near Spokane. The rock is generally of very high grade, and further operations may be expected, quarrying and crushing operations if not cement mills. Two high grade ceramic clay deposits exist in the area. They are regarded by some as being as good or better than the

clay deposits in the Tennessee Valley about which so much has been written. In time, local industry will spring from them. The Snake River canyon contains many metallic and non-metallic deposits. Copper, iron oxide, ceramic clays and silica, limerock molyboenum and lignite were mentioned. At the confluence of the Snake and the Grande Ronde Rivers is a deposit of exceptionally high grade limerock which is sure to be developed as soon as railroad or slackwater transportation to the site becomes available. This site also contains deposits of ceramic clays and silica which depend on rail or water transportation to be developed. In the northern part of the project area are three garnet mines. Magnesite deposits are also reported in the same area.

Recreational. There is no clearly defined recreational section in the project area. The mountains and streams in the eastern and northern reaches offer many opportunities for fishing and hunting, and summer cottages and homes will develop here and there through the favorable sections. No lakes exist around which summer camp development is apt to take place.

Railroad and Highways. The area is for the most part amply provided with roads and railroads. The Union Pacific, and the Northern Pacific and the Milwaukee provide the principal rail service. The Great Northern and the Washington, Idaho and Montana Railroads (Potlatch owned) also serve portions of the area. Asotin County receives no rail service. It is one of two counties in the State of Washington that is without rail service. In the near future a federal aid highway will be built into Montana over Lolo Pass from the present terminus of a highway on the main branch of the Clearwater River. It will provide east-west

traffic between Montana points and Portland with a big saving in time and distance. It will take some traffic from Spokane.

Proposed River Development. Within the next ten years slack-water transportation is expected to be extended up the Snake River as far as Lewiston. Four, five or six dams, the exact number not yet being determined, will eliminate all of the rough water between the mouth of the river and Lewiston. The McNary Dam on the Columbia River at Umatilla will provide slack water from the dam to the mouth of the Snake. With the completion of the dams, barge hauling of bulk items to and from Lewiston will be very considerable. The dam nearest Lewiston will probably be located at Bishop, in REA cooperative (Washington 18 Spokane) territory. It will have a generating capacity of approximately 100,000 kilowatts.

Summary. The project area has excellent agricultural and timber resources now under development. It has extensive mineral resources not yet developed. It has a bright agricultural and industrial future.

SOURCE OF SUPPLY

The cooperative's system is at present energized from one substation owned by the Washington Water Power Company adjacent to the town of Juliaetta. Power was originally purchased from the Washington Water Power Company but was later contracted from the Bonneville Power Administration through transfer agreements between that agency and the Washington Water Power Company which will expire 18 months after the official declaration of the end of the war.

The capacity of this substation was recently increased from one bank of Three -- 333 KVA transformers to two banks of Three -- 333 KVA transformers operating in parallel making a total of 2,000 KVA capacity. This substation also supplies the Washington Water Power requirements in the Juliaetta -- Kendrick area. Energy is purchased at present under the terms of Bonneville Power Administration's Schedule E-2 which provides for a 3.5 mill ceiling on the cost of purchased energy for a period of four years after the official declaration of the end of the war.

The present source of supply is rapidly becoming inadequate due to load growth which is indicated by the tabulation of peaking demands on the following page and shows an increase of 440 KW or almost 50 percent from August 1945 to August 1946. Increased loads have created unsatisfactory voltage conditions on outlying sections of the system and prohibits the serving of additional farm and industrial loads except on certain sections close to the substation.

It is tentatively proposed to establish five new points of delivery as illustrated on Drawing No. 1 in order to adequately serve present and anticipated loads.

Month	Night Peak KW	Night Peak Time	Day Peak KW	Day Peak Time	Low Peak KW	Low Peak Time	Difference Night-Day Peak
		9:30pm		11:30am		1:00am	
July 1945	860	10:00pm	880	12:00n	300	5:30am	---
		8:30pm		10:30am		1:00am	
August	970	9:00pm	820	11:30am	300	5:00am	150
		8:30pm		11:30am		1:00am	
September	1000	9:00pm	790	12:00n	300	5:00am	210
		5:00pm		9:00am		11:00pm	
October	1050	5:30pm	660	10:00am	300	5:00am	390
		5:30pm		10:00am		11:00pm	
November	1080	6:00pm	600	11:30am	300	5:00am	480
		5:30pm		7:00am		12:30am	
December	1110	6:00pm	720	7:30am	300	5:00am	390
		5:30pm		12:00pm		12:00pm	
January 1946	1140	6:00pm	900	12:30pm	300	4:30am	240
		5:30pm		7:30am		12:00pm	
February	1132	6:00pm	720	8:00am	300	5:30am	412
		7:00pm		8:45am		12:30am	
March	1118	7:30pm	600	12:30pm	300	5:30am	518
		7:30pm		11:30am		1:30am	
April	1148	8:00pm	675	12:00n	300	4:30am	475
		7:30pm		11:30am		1:30am	
May	1148	8:00pm	720	12:15pm	330	5:00am	428
		8:30pm		8:30am		12:00n	
June	1110	9:00pm	800	1:30pm	400	5:30am	310
		9:00pm		12:00n		11:30pm	
July	1180	9:30pm	1020	1:00pm	600	7:30am	160
		7:30pm		11:00am		12:30am	
August	1410	8:00pm	1160	11:30am	400	4:30am	250

Estimates of loads are correspondingly subdivided in order to reflect the anticipated load growth at each of the tentative points of delivery, and are set forth in Tables VIII to XIII, inclusive. A summary of total project loads is made in Table XIV.

The cooperative has petitioned the Bonneville Power Administration to provide adequate sources of power supply at Points "A", "B", "C", and "F" and it is understood that Bonneville Power Administration has requested funds for the construction of transmission and substation facilities necessary to accomplish this in its 1948 Budget requests.

An immediate source of supply must be provided at points "B" and "C" if the cooperative's program of area coverage is not to be seriously impaired. The Washington Water Power Company has tentatively offered the cooperative Bonneville power through its transfer agreements at the following points: (1) Three-phase power at Orofino, (2) Three-phase power in the vicinity of Garfield, (3) Single-phase power in the vicinity of Craigmont, and (4) Single-phase power in the vicinity of Asotin. The first point of delivery "B" can temporarily be served by the installation of a Bonneville substation near Orofino to be energized from the 66 KV transmission line of the Washington Water Power Company now terminated at that point. This arrangement should be completed not later than March 1947 in order that adequate power will be available to serve industrial consumers in that area who have made application for three-phase service.

The cooperative has made application to the Rural Electrification Administration for funds with which to construct facilities to enable it to deliver power at Point "C" by means of a connection

at Garfield with the lines of the Washington Water Power Company. The proposal further entails the construction of additional substations and transmission lines from Point "C" to Point "D" in order to provide adequate three-phase power to industrial consumers in the Fernwood area (Point "D"). It is understood that Point "C" may at some future time be served from a proposed transmission line to be constructed through that point by the Bonneville Power Administration.

OTHER UTILITIES

The Washington Water Power Company operates extensively throughout the area, serving all of the larger towns and part of the rural area. The extent of its transmission network is illustrated on the enclosed Drawing No. 1. In addition this Company sells wholesale power to the Potlatch Forests, Inc. at the Idaho--Washington boundary from where it is transmitted over a 66 KV transmission line, owned by the latter, to the town of Potlatch, where a large electric sawmill is operated by Potlatch Forests, Inc. The Washington Water Power Company operates a generating station of approximately 10,000 KW capacity at the Potlatch Mill Dam on the Clearwater River in Lewiston. Towns and villages served by this company in the area include Lewiston, Lewiston Orchards, Moscow, Genesee, Princeton, Deary, Bovill, Juliaetta, Kendrick, Orofine, Culdesac, Winchester, Reubens, Craigmont and Nez Perce, all in Idaho, and Farmington, Garfield, Palouse, Uniontown, Clarkston and Asotin in Washington.

The Kootenai Rural Electrification Association (REA cooperative, Idaho 11 Kootenai) distribution system adjoins the cooperative area on the north. The Idaho County Light and Power Association (Idaho 15 Idaho) distribution system adjoins it on the south and east while the Inland Empire Rural Electrification Association (Washington 18 Spokane) distribution lines serve the entire area in the State of Washington to the west of the cooperative area.

The Village of Elk River is served by a municipally owned electric distribution system. Power is purchased from the Washington Water Power Company at a point in the vicinity of Bovil and is transmitted over a 22 KV transmission line owned by the

Village of Elk River. Two rural consumers are served along this line.

The Pierce Light & Power Company owns the electric distribution system in Pierce. Power is supplied by a diesel electric generating plant at 2,300 volts. The system is confined to the urban area. Power supply is inadequate and this company has entered into a contract with the Washington Water Power Company for the purchase of approximately 200 KW of power to be transmitted over a 66 KV transmission line now being constructed by the Washington Water Power Company. The possibility of acquiring the Pierce Light & Power Company by the cooperative is discussed in another section of this report.

RATES

The Washington Water Power Company serves all of the territory contiguous to that of the Association. A comparison between its residential rates and those of the Association is as follows:

	Farm & Home Schedule of Association		Washington Water Power Company
	Asotin County	All Other	
Minimum Charge	$ 3.50	$ 3.30	$ .90
Energy Obtained for Minimum	None	35 KWH	14 KWH
Cost of 100 KWH	7.00	6.23	3.42
200 "	9.00	8.73	4.56
300 "	10.50	10.23	5.56

The commercial and power schedules of Washington Water Power and the Association are as follows:

Washington Water Power Schedule 13 General Service Monthly Rate:

90¢ for the first 14 KWH or less
3.6¢ per KWH for the next 186 KWH *
2.5¢ " " " " " 300 KWH *
1.3¢ " " " " " 3,000 KWH
0.9¢ " " " " " 15,000 KWH
0.6¢ " " " " " 50,000 KWH
0.3¢ " " " all additional KWH

* Add 30 KWH for each KW of demand in excess of 7

Minimum: 90¢ plus $1.00 for each KW of demand in excess of 7, but not less than $2.50 for three-phase service; unless a higher minimum is required under contract to cover special conditions.

Washington Water Power Schedule 21 Large General Service (Not less than 75KW).

Monthly Rate:
$87.50 for the first 75 KW of demand or less
$ 1.00 per KW for all additional KW of demand
0.9¢ per KWH for the first 60 KWH per KW of demand, but not less than 21,000 KWH
0.6¢ per KWH for the next 40,000 KWH
0.3¢ per KWH for all additional KWH.

Minimum: The monthly minimum shall be the lesser of (a) or (b) below but not less than the current demand charge.

(a) The highest demand charge during the current twelve month period.

(b) The amount required to make the total charge for service for the current twelve month period equal to twelve times the highest demand charge during such period.

Clearwater Valley Light and Power Association Schedule B -- Commercial and Industrial Lighting and Power Service.

First 35 KWH per month at 9.5¢ per KWH
Next 65 KWH per month at 4.5¢ per KWH
Next 400 " " " " 3.0¢ " "
Next 1,000 " " " " 1.5¢ " "
Next 13,500 " " " " 0.8¢ " "
Over 15,000 " " " " 0.5¢ " "

Provided, however, that if the billing demand exceeds ten kilowatts, all kilowatt--hours used in excess of 360 times the measured demand in kilowatts shall be billed at the rate of 0.25¢ per KWH.

Demand Charge: First ten kilowatts of billing demand per month, no demand charge. Excess above 10 kilowatts of billing demand at $1.30 per kilowatt.

Minimum Monthly Charge: The minimum monthly charge under the above rate shall be $3.50 where 5 KVA or less of transformer capacity is required. For consumers requiring more than 5 KVA of transformer capacity the minimum monthly charge shall be increased by 75¢ for each additional KVA or fraction thereof required.

The rates in Pierce, Idaho, a small town not at the moment contiguous to the lines of the Association but included in the ultimate project area, are as follows:

Residential -- Without a Range
30 KWH at 15¢ per KWH
All over at 7¢ per KWH
Minimum: $2.00

Residential -- With a Range
30 KWH at 15¢ per KWH
All over at 4¢ per KWH
Minimum: $2.00

Commercial Lighting:
30 KWH at 15¢ per KWH
Next 70 KWH at 13¢ per KWH
Next 100 KWH at 10¢ per KWH
Next 100 KWH at 8¢ per KWH
All over 300 KWH at 6¢ per KWH
Minimum: $2.00

Commercial Power:

100 KWH	at 6¢ per KWH
Next 100 KWH	at 5¢ per KWH
All over 200 KWH	at 4¢ per KWH
Minimum: $2.00	

The rates in Elk River, Idaho, served by a municipally -- owned system, are as follows:

Residential

35 KWH	at 10¢ per KWH
All over	at 3¢ per KWH

Commercial Lighting

8¢ per KWH straight

Commercial Power

$3.50 per connected horsepower plus 1¢ per KWH.

The system purchases its power from the Washington Water Power Company at Bovill, Idaho, at the rate of $3.50 per demand horsepower plus 1/2¢ per KWH.

TYPES OF LOADS TO BE SERVED

The loads which are served now, or which may be served in the future by the cooperative, are discussed in the following pages. As materials become available and feasibility is established, the cooperative contemplates an extensive construction program to serve the remaining number of unserved farms and other loads.

Farm Loads: Consumption of electricity by the cooperative's members has been greatly retarded by wartime and postwar shortages of electrical appliances and farm equipment. Average consumption was effected adversely during the prewar years by the constant addition of new members, most of whom, following a definite pattern, acquired energy consuming equipment and devices at a gradual rate, thus serving to reduce the average consumption of the older members. The following tabulation of average consumers and consumptions (Table I) is included to illustrate this point and to demonstrate that in spite of the continual addition of new members during the early years, and the intervening war years during which time few consumers were added and new equipment was practically unobtainable, the average monthly consumption of farm members increased at the rate of approximately 15% per year.

TABLE I

Year	Average No. of Farms Served	Yearly Increase	Annual Av. Monthly KWH Consump.	Annual Percent Increase	Average Mo. Minimum Bills to Farms
1938 (4 mo)	369	- -	39	- -	176
1939	1154	785	42	7.69	484
1940	1722	568	53	26.19	615
1941	2060	338	56	5.66	693
1942	2236	176	63	*12.50	705
1943	2215	-21	76	20.64	615
1944	2322	107	82	7.90	648
1945	2389	67	96	*17.07	610

Average % increase including 4 mo. average 1938 13.95%
Average % increase disregarding 4 mo. average 1938 14.99%
*Rate reduction was made.

To further illustrate the most recent increase in average consumption and farm members served, a comparison of the first 8 months of 1946 to the same months in 1945 is presented below.

TABLE II

Month	No. of Farms Served 1945	1946	Inc.	Av. KWH per Farm 1945	1946	%Inc.	% Farm Min. Bills 1945	1946
Jan.	2332	2438	106	94	117	24.5%	17%	16%
Feb.	2326	2459	133	93	111	19.4	20	18
March	2336	2469	133	85	104	22.4	28	21
April	2365	2519	154	88	110	25.0	30	22
May	2396	2555	159	95	112	17.9	33	30
June	2393	2595	202	87	111	27.6	33	30
July	2409	2599	190	87	117	34.5	33	28
Aug.	2425	2611	186	105	134	27.6	25	25
TOTAL	18,982	20,245	1,263					
AVERAGE	2,373	2,531	158	92*	115*	25%*	27**	24**

* Based on total farms served and total KWH sold.
** Based on total number of minimum bills.

The foregoing statistics indicate that the average monthly consumption on farms during the first 8 months of 1946 registered an increase each month greater than the previous annual average of 15 percent and an overall average increase of 25 percent over the first 8 months of 1945. This increase was experienced in

spite of the fact that an average of 158 new farms were connected during the latter period. Attention is directed to the fact that the percentage of minimum accounts billed has shown a consistant decrease in 1946 from the values reflected for 1945.

During March and April of this year a questionnaire was mailed to each member of the cooperative requesting information as to the number and kind of appliances and farm equipment each was using and what appliances and equipment each contemplated acquiring and using as soon as possible. The returns of this questionnaire along with other information contained in this report have been used as a basis for estimating future increases in KWH consumption per farm member.

A total of 624 replies, 23.32 percent of the 2,676 questionnaires mailed, were returned, all of which were from farm and non-farm members with the exception of 10 received from commercial consumers. A summary and breakdown of returns has been made on the basis of the geographical location of the members. The questionnaires returns were identified with areas to be served by proposed substations, the locations of which are shown on Drawing No. 1 and designated as follows:

Delivery Point	Location	County	Designation
"A"	SW Juliaetta	Latah	Juliaetta
"B"	Vicinity of Orofino	Clearwater	Orofino
"C"	NW of Potlatch	Latah	North
"D"	Vicinity of Fernwood	Benewah	Fernwood
"E"	S of Jacques Spur	Nez Perce	Jacques Spur
"F"	Vicinity of Anatone	Asotin	Anatone

The foregoing breakdown of the returns according to geographical areas from each of the six sections of the project indicated the following anticipated consumption as soon as appliances and equipment become available:

TABLE III

Delivery Area	No. of Returns	Average Monthly KWH Consumption Domestic	Farm Equip.	Refrigeration*	Total
A	212	268.5	99.4	49.4	417.3
B	39	185.4	94.8	40.5	310.7
C	162	247.2	98.3	46.2	391.7
D	22	190.6	94.2	52.7	337.5
E	161	349.4	108.6	52.2	510.2
F	18	367.0	92.5	57.8	517.3
TOTAL	614	283.53	100.48	48.2	432.21

* Exclusive of conventional kitchen refrigeration.

In order to test the value of the questionnaire returns as a true cross section of member intentions an analysis was made as to the type of consumers who had returned questionnaires. The consumption of each returnee for the month of April 1946, was tabulated from the cooperative's records (April was selected since the returns were made in April). This tabulation indicated that the average consumption of all farm and non-farm members returning the questionnaire was 149 kilowatt hours. Since the average consumption on farms for the project as a whole during the month of April was 110 kilowatt hours it was thought that the returns may have been weighted by those from large consumers.

A further breakdown was prepared to show the different consumption groups from whom questionnaires were received and the percentage and total kilowatt hour consumption in each group.

It is significant from this analysis that during the month of April approximately 22 percent of all farm consumers billed by the cooperative were minimum users and that 20 percent of all the questionnaires returned were from this group. Likewise, it is interesting to note that while 15.15 percent of the questionnaires were returned by members using in excess of 300 kilowatt hours per month, this group accounted for 56.48 percent of the

total kilowatt hours consumed by those members returning questionnaires. Furthermore, the 26 largest consumers, representing 4.24 percent of the number of returns, accounted for 25.21 percent of the total consumption of those returning questionnaires.

An analysis was also made showing a comparison between different consumption groups from whom questionnaires were received and corresponding consumption groups for the total number of farms served by the cooperative in April 1946.

It is interesting to note from this latter analysis how closely the grouping of the questionnaires returned follows the grouping of the entire farm membership. Of particular interest is the percentage (23.77 percent) of questionnaires returned by members who used less than 40 kilowatt hours per month as compared to the percentage (23.13 percent) of all farms falling in this group.

It appears from the various analyses made that with the exception of the users above 300 kilowatt hours per month a fairly representative return of questionnaires was received. In order to eleminate the effect the large users might have had on the estimated consumption as derived from the overall questionnaire returns, the returns of the 26 consumers using in excess of 599 kilowatt hours were omitted from the total and adjustments made to bring the average kilowatt hour consumption of those returning questionnaires in line with the average consumption of all farms served by the cooperative in April 1946. In the same ratio, corresponding adjustments were made in the estimated average consumption as derived from the questionnaire survey, thus reducing the estimated average consumption by 4.51 percent for the total return.

A like reduction has been made in the estimated average consumption for each of the six sections of the project area as follows:

Section	Av. KW for Return	Adjusted Av. KWH for All Farms (Less 4.51%)
A	417.3	398.5
B	310.7	296.7
C	391.7	374.0
D	337.5	322.3
E	510.2	487.2
F	517.3	494.0
TOTAL	432.21	412.72

The questionnaire as circulated asked specifically what equipment and appliances each member was using and those items which they intended adding "as soon as possible". A marked jump in the rate of increase of the average kilowatt hour consumption on the farms is noted for the first 8 months of 1946 over the same period in 1945 as indicated in Table II of this report. Specifically, the rate of increase was 25 percent for 1946 as compared to an average rate of increase of 15 percent per year since 1938. This increase probably indicates that some farm equipment and domestic appliances are becoming available. It is probable that as more appliances and equipment become available this rate of increase will be maintained or exceeded. Since it is problematical whether or not supplies of appliances will be equal to the demand by 1948, it is assumed that the indicated monthly consumption on the farms will not be attained until 1951. This represents an annual increase of approximately 27 percent for each of the next 5 years, at which time it is assumed that farm members will have been able to secure all of the equipment they have indicated they would purchase.

In order to arrive at the estimated consumption in 1948 an average increase of 27 percent (slightly higher than the 25 percent increase indicated for 1946) has been applied to the 1945 average farm consumption of 96 kilowatt hours per month. Since the base consumption estimate is assumed to be applicable in 1951 and the breakdown for each section is for that year, the estimated monthly consumption arrived at for 1948 is equivalent to a decrease in the 1951 estimate by 27 percent each year for 3 consecutive years.

The table of rate of increase set forth in Table I of this report indicates that the average monthly consumption during the period from 1938 to 1945 inclusive increased at an average rate of approximately 15 percent per year. It is conservatively estimated that the rate of increase from 1951 to 1956 will approximate at least 10 percent per year. This results in the following final estimated average consumption for farm members:

TABLE IV

Section	1948		1951		1956	
	Monthly	Annually	Monthly	Annually	Monthly	Annually
A	195	2340	399	4788	641	7692
B	145	1740	297	3564	477	5724
C	183	2196	374	4488	601	7212
D	157	1884	322	3864	517	6204
E	238	2856	487	5844	782	9384
F	241	2892	494	5928	793	9516
TOTAL	202	2424	413	4956	663	7956

In order to arrive at the estimated number of rural members which the cooperative could be expected to be serving by the end of 1948, 1951 and 1956, a work map of the entire cooperative area was prepared showing all of the existing and proposed

cooperative lines, members served at present, members for which funds have been allocated and members which may be served in the future for which no funds have been allocated at present. A map count of all rural farm and commercial members was made and segregated as to those served now, those for which funds have been allocated and those for which no funds have been allocated at present but which the cooperative expects to serve within the next 10 years. Since it is probable that a certain number of prospective members will be too far removed from the lines to receive service, even under an area coverage plan, while others will have been served by other utilities, it is estimated for purposes of this report that not more than 95 percent of the total number of rural improvements will be receiving service from the cooperative by the end of 1956. The cooperative is now constructing lines to serve new members included in a $590,000 allocation made February 20, 1946. It is assumed that all of the members in this latter allocation will be receiving service by the end of 1948. The estimated number of rural consumers to be served by 1948 was arrived at by adding the number of members to be served under this allocation to the number being served at present in each of the sections of the project. It has been assumed that 50 percent of the remaining unserved members will be receiving service by 1951 and the balance by 1956.

Unit kilowatt demand values per consumer are derived from maximum demand curves contained in REA Engineering Memorandum No. 33R3, dated May 20, 1946. Curves for values in excess of 500 kilowatt hours per month usage were estimated.

Non-Farm & Village Consumers: Approximately 23 percent of all the questionnaires returned were from non-farm members, the majority of whom are located in the numerous small unincorporated villages now being served by the cooperative. The agricultural villages are populated, for the most part, by merchants and retired farmers. The villages in areas "B" and "D" are populated to a greater extent by lumber workers who are to some extent itinerant in that a large number reside in the villages during the winter months and move their families to the "woods" during the logging seasons. The questionnaire was not analyzed to reflect the actual number returned by each village other than the fact that 23 percent were returned by non-farm members. A cursory examination indicates that the non-farm members intentions are approximately on the same level as the domestic intentions of the farm members. Therefore it is assumed that the overall intentions of non-farm members in each project section will equal the domestic intentions of the farm members. Accordingly the consumption of non-farm members in each section is based on the indicated domestic intentions set forth in Table III of this report and has been adjusted in the same manner as has the farm intentions, as follows:

TABLE V

Section	1948		1951		1956	
	Monthly	Annually	Monthly	Annually	Monthly	Annually
A	131	1572	269	3228	432	5184
B	90	1080	185	2220	297	3564
C	121	1452	247	2964	397	4764
D	93	1116	191	2292	307	3684
E	169	2028	349	4188	560	6720
F	177	2125	367	4404	589	7069
TOTAL	139	1668	284	3408	456	5472

The number of non-farm or village members to be served was arrived at on a basis similar to that of farm members. The records of the cooperative reflect all of the members now being served, as well as the total number of prospects, in each village. A breakdown by village in each section follows:

TABLE VI

Section	Village	Consumers Served	Consumers Prospective	Consumers Total
"A"	Avon	9	4	13
	Cameron	10	5	15
	Gifford	21	15	36
	Leland	12	20	32
	Lenore	16	1	17
	Lookout	6	10	16
	Myrtle	7	4	11
	Southwick	31	9	40
	Spalding	26	27	53
	TOTAL Section "A"	138	95	233
"B"	Ahsahka	59	30	89
	Cavandish	10	1	11
	Shmidt's Mill	36	2	38
	Weippe	174	74	248
	Peck	57	15	72
	TOTAL Section "B"	336	122	458
"C"	Desmet Mission	12	45	57
	Harvard	34	3	37
	Tensed	52	14	66
	TOTAL Section "C"	98	62	160
"D"	Clarkie	39	9	48
	Emida	33	17	50
	Fernwood	76	32	108
	Santa	24	5	29
	TOTAL Section "D"	172	63	235
"E"	Melrose	7	3	10
	Sweetwater	27	9	36
	Waha	7	1	8
	TOTAL Section "E"	41	13	54

(continued next page)

TABLE VI (continued)

Section	Village	Consumers Served	Prospective	Total
"F"	Anatone	31	10	41
	Flora	0	20	20
	Troy	0	32	32
	TOTAL Section "F"	31	62	93

For estimating purposes it was assumed that an ultimate of not more than 95 percent of the village members would be receiving service by the end of 1956. The 1948 estimated number of village members to be served was arrived at by adding the present number of village members being served to 33 1/3 percent of the remaining prospects after the ultimate figure of 95 percent of the total had been ascertained. Similarly it was assumed that another 33 1/3 percent would be connected by the end of 1951 and the remaining 33 1/3 percent of the prospects by the end of 1956.

Unit kilowatt demand values are derived from the maximum demand curves in REA Engineering Memorandum No. 33R3, revised May 20, 1946.

House Heating: The heating of homes by means of electricity is becoming of increasing interest to home owners through the Northwest. Much thought and consideration has been given this subject in recent years by private utilities and public agencies supplying central station service. Numerous tests have been conducted in an effort to learn the characteristics of this type of load and what effect it would have on the carrying capacity and maximum peak load of an average electric distribution system. The results of these tests, some of which are still being conducted, indicate that

electric heating systems either central systems or systems employing individual thermostatically-controlled units create demands of unusual magnitude, are of course seasonal, and have fairly good load factors for the months during which they are in use. It is anticipated that house heating will contribute approximately 2000 kilowatts to the total load of the cooperative by the end of 1956. However, peak house heating loads appear on the system at an early hour (probably from 6 to 8 a.m.1/) and diminish rapidly after the premises to be heated have reached the normal daytime temperature. For this reason house heating up to a reasonable amount is not expected to increase maximum demands or materially change the time of peaking.

The cooperative has at present a request for service to one new home in the vicinity of Lenore, which is to be completely heated by electricity. At least one other member in the same vicinity has indicated that he would convert to electric heating in the near future. The cooperative has had at least twelve inquiries regarding the availability of equipment and cost of house heating by means of electricity. Other inquiries are being received periodically. Cost of service on present rate schedules does not appear to be prohibitive in comparison to $15 per ton coal and 11¢ per gallon fuel oil. Preston-log supplies are limited due to the cost of manufacturing equipment and royalities demanded by patent holders. Wood for fuel is not readily available at cheap prices on all parts of the project. For these reasons, cost of service will

1/ Tests conducted 1945-46 by the Portland General Electric Co.

not seriously retard the consumer acceptance of electrical house heating. It appears that electrical house heating is at approximately the same level at this time as was electric cooking twenty years ago.

The number of electrically heated homes which the cooperative will be serving at the end of 1956 is not accurately predictable at this time. However, a means has been evolved which appears to be reasonable and satisfactory for estimating purposes. Local real estate agents estimate that approximately 3 percent of all rural homes are rebuilt or replaced by modern structures annually. During the last 4 war years practically all domestic construction was at a stand-still with the result that a backlog of at least 12 percent of the total number of farm dwelling replacements has resulted. It is reasonable to assume that at least 10 percent of 3 percent (normal dwelling replacement) or 0.3 percent of the farms served by the cooperative will be equipped each year for electric heating. (It is probable that this percentage will be exceeded at the end of ten years.) As building materials become more readily obtainable a more accelerated program of replacement will be experienced until the backlog of 4 years building construction is overcome. It is assumed that this will be accomplished over the next four years by doubling the normal rate of replacement. On this basis 0.6 percent will be replaced in 1947 and 1948 resulting in an electric heating load of 1.2 percent of the number of farm and village consumers served by the cooperative in 1948. At that time 50 percent of the backlog of construction will have been liquidated. Proceeding on the same

basis there would be a 0.6 percent replacement in 1949 and 1950 (at which time the entire backlog would be caught up) and a 0.3 percent replacement in 1951 making a total of 1.5 percent equipped for electric heating for the years 1949 to 1951, inclusive, which added to the 1.2 percent for 1947 and 1948 would result in 2.7 percent of the total farm and village consumers served in 1951 being equipped for electric heating. Likewise an additional 1.5 percent (5 yrs. @ 0.3%) would be added to this figure during 1952 to 1956, inclusive, making a total of 4.2 percent to a total of 6339 rural and village consumers, a total of 267 elec-heating installations, prorated throughout the various sections of the project, will be served by the cooperative by the end of 1956.

Tests conducted by the Bonneville Power Administration indicated an average maximum demand of 11 kilowatts and an annual consumption of 17,500 kilowatt hours for 5 and 6 room homes. To this demand an overall system diversity factor of 1.5 has been applied in arriving at the amount by which system peak will be increased by the serving of electrical house heating installations.

Irrigation: Irrigation in the Association's area is now on a very limited scale. The Lewiston Orchards Irrigation District near Lewiston and the irrigation development on the west bank of the Snake River between Clarkston and Asotin in Asotin County is served by Washington Water Power Company.

The cooperative now has two irrigation loads. Mr. Charles Kirby at Cherry Lane in Nez Perce County irrigated with sprinklers approximately 80 acres this past season, his first.

Water is taken from the Clearwater River at two places and is raised a distance of about 35 feet through two pumping stations, each consisting of two 7½ hp motors and pumps connected to a 6-inch pipe line.

Farmers over a wide area are watching the operation with much interest. Its success will stimulate other sprinkler irrigations. The operating record so far this season from the beginning of irrigation to September 12, inclusive, is as follows:

Total power used at both pumping stations: 19,239 kwh
Total cost of power used: $214.94
Average power use per acre to September 12: 204 kwh
Average cost of power per acre to September 12: $2.69

This very favorable record has induced Mr. Kirby to irrigate 160 acres next year, and it should prompt others to irrigate where conditions are suitable.

The second irrigation service is to Mr. Art Walk, who lives near Lewiston. He uses 5 hp to pump water to ditch irrigate 40 acres. He plans to use 10 ph next season.

Additional irrigation possibilities exist in the area served by the cooperative. County Agent J. W. Thometz of Nez Percy County, and officials of the Association estimate the following acreages of irrigable land in the areas designated:

Along the Clearwater River (Nez Perce County)...	750 acres
Clearwater County (near Ashaka).....	150 acres
Sweetwater Valley.....	5000 acres
Along Snake River (Asotin County).....	500 acres
Along Snake River (Whitman County).....	450 acres
TOTAL	6850 acres

The foregoing areas comprise the only places in the project where power for irrigation is apt to be needed in considerable amounts. All of it would be for sprinkler irrigation.

Lack of water sources in the other sections will block anything but casual use of power for irrigation. The development of the frozen foods industry at Lewiston should give impetus to the development of all acreage suited for irrigation. Smith's Frozen Foods is anxious to increase its contacts with farmers for cherries, apricots, peaches, tomatoes, asparagus, raspberries, and strawberries. None of them can be grown successfully in the area without irrigation. Therefore, it is reasonable to expect that there will be a considerable demand for irrigation power in the next ten years. For purposes of load estimating, it has been assumed that of the total of 6,850 acres that are regarded by various authorities as being irrigable, 3300 acres will be under irrigation in ten years.

Summarizing the irrigation possibilities, it is estimated that there are approximately 3300 acres of land throughout the cooperative area which will be under irrigation by the end of 1956. It is expected that sprinkler irrigation will be the predominant method and for purposes of estimating the power requirements which will be served by the cooperative, it is assumed that irrigation units will be comprised of an average of 30 acres each. Water lifts will vary from 15 feet in the Sweetwater Valley to a maximum of 50 feet along the Snake River.

A conservative rule-of-thumb which can be safely followed in estimating sprinkler irrigation loads is that 1 horsepower will irrigate 5 acres of land where water lifts do not exceed 50 feet. On this basis a 30 acre plot would require a 6 horsepower installation. For estimating purposes it is assumed that the average installation will be a 7.5 horsepower motor with a

demand of approximately 6 kilowatts. Overall diversity factors of 1.43 for 0-50 installations, 1.67 for 51-100 installations, and 2.0 for all over 100 installations, in each substation area has been applied to arrive at the magnitude of system demands occasioned by sprinkler irrigation.

Only one large irrigation pump is included in the estimates of loads. The Lewiston Orchards Irrigation District has requested service for a 250 horsepower three-phase installation at Lake Waha. The lake is some distance from the irrigation area. Water from it is pumped over a low ridge to a stream that flows into a collection reservoir. A hydro electric plant is located below the lake and the power generated is transmitted back to the pump house where it operates the electric motor that powers the pump. The hydro generators are old and the District has requested the Association to furnish an estimate of the cost of purchased power. The load, amounting to 250 KW is included in the load estimates.

For estimating purposes a diversity factor of 1.5 has been applied in arriving at the demand this installation would contribute to the system demand. Records available in the office of the Lewiston Orchards Irrigation District indicate that this pump will operate fully loaded for the equivalent of two full months or 1440 hours each season.

Agricultural Industries: Agricultural industries, actual and potential include grain elevators, seed elevators, frozen food plants, locker plants, food dehydration plants, hay drying and briquetting on a commercial scale, and chemurgic plants.

Of these, the cooperative now serves grain elevators at

Jacques Spur, Sweetwater, Peck, Grinnel, Walters and Saltese: two seed warehouses at Lenore; and one small flour mill at Peck. All receive single-phase service except two grain elevators, the two seed warehouses and the flour mill, which together have a total connected load of 210 hp. Small locker plants are located at Weippe, Anatone and Princeton, each less than 5 hp.

Potential load is divided into prospects that seem reasonably assured and those that hinge on further development of trends or experiments now under way. Only those that seem reasonably assured appear in tables of load estimates. The others are mentioned in order to provide a picture of what may develop within the forecast period. Loads that seem reasonably assured follow.

A number of grain elevators have been included in the estimates of loads. Some are receiving single phase service now but are planning increases in connected load as indicated in the load estimates. Each section was treated separately in arriving at an average demand per grain elevator and an overall diversity factor of 2.0 has been applied in arriving at contributed demands to overall system demands. Consumption estimates are based on actual consumption records of similar elevators on this and other projects.

Other agricultural industries such as seed warehouses, locker plants, a flour mill, etc., have been treated in the same manner in arriving at estimated kilowatt demand and kilowatt hour consumption values.

Another reasonably assured load is that of pea viners. The raising of green peas for freezing and canning is a growing

activity in the project area. Smith's Frozen Foods in Lewiston hopes to triple the acreage in peas under contract to it. The present practice is for portable pea viners and their crews to go from farm to farm where peas are grown. As acreage in green peas increases, it is expected that viner stations will be established in fixed locations. The manager of Smith's Frozen Foods believes that three viners would go from a low station to a higher one as the peas matured progressively from low altitudes to higher altitudes. With viners operating at a few fixed locations, it would be possible to use electric power instead of internal combustion power for their operation. Each station would require power for twelve 10 horsepower motors, which would operate continuously day and night for about 30 days. In long established pea growing areas where fixed viner stations are the rule, it is the practice for the canning and freezing companies that provide the viners to also provide transformers. Little investment on the part of the cooperative to serve this type of load would thus be required.

Pea viners, while being highly seasonal, will operate continuously during the pea harvest season. A diversity factor of 1.5 has been applied in estimating the demand. Each viner installation will consist of three banks of four 10 horsepower motors. It is assumed that two banks will be in continuous operation at full load for 720 hours per season and will require 57,600 kilowatt hours per season.

An agricultural industry that is somewhat uncertain as to likelihood of development is a honey processing plant. Clover seed is one of the principal seed crops in Lewis County. A

large number of bee hives are located in the area to assure pollination. An early report indicated that R. H. Bradshaw & Sons, Wendall, Idaho, -- located in southern Idaho -- would establish a processing plant in the county. A later report indicated that they were undecided. Inasmuch as clover seed production in the area is apt to increase further, more bee hives will be established and more honey will be produced. Therefore, the odds in favor of Bradshaw or some other precessor operating a plant in the area seem better than the odds against a plant, and therefore one is included in the load estimates.

The foregoing completes the enumeration of agricultural industrial loads that seem reasonably assured of development during the next ten years. Loads which are insufficiently assured to warrant inclusion in the table of load estimates, but which have possibilities of development follow.

Smith's Frozen Foods operate a large freezing plant in Lewiston. Its installed power equipment amounts to approximately 1,000 horsepower. He visions the possibility of a second plant near Craigmont, Idaho, (Washington Water Power town), but the diversity of products grown in that area does not compare with the diversity in the Lewiston area, nor is it likely to improve, which means that a freezing plant near Craigmont would be largely a one crop plant. Therefore, a second Smith's Frozen Foods plant there does not seem likely enough to be included in the reasonably assured loads. It is mentioned here because the manager stated that if he does not build one, someone else, perhaps a cooperative would.

Another potential market for power that cannot be listed

as reasonably assured is commercial hay drying and briquetting. Mr. Paul A. Eke, Head, Department of Agriculture Economics, University of Idaho, described experiments that the university has underway in an effort to briquette alfalfa hay. If the remaining aspects of the experiments -- largely a matter of determing whether the pressed product is palatable to animals and poultry -- prove successful, there may develop one briquetting station to each 2,000 acres of alfalfa land. Each station would require about 75 horsepower and would use from 150,000 to 180,000 kilowatt hours annually, exclusive of power for drying or chopping.

The University of Idaho is also expermenting with improved methods of dehydration. If early results are confirmed by further experimentation, fruits and vegetables will be dehydrated quickly and without loss of flavor and will keep in ordinary storage for years. The experimenters believe that the process will enable dehydrated foods to compete successfully with frozen foods. It is reported in a recent issue of Fortune Magazine that Birdseye Frozen Foods, now a subsidiary of General Foods Company, is initiating a line of dehydrated foods which they claim to be greatly superior to anything heretofore available. Washington State College is also experimenting with new methods of dehydration. Their aim is to find a method of perserving fruit that is too ripe to ship. As with briquetted hay, these experiments with imporved methods of dehydration should be carefully followed for their bearing on additional uses for power in rural areas everywhere.

Chemurgic plants are also a possibility for the future in the project area. The chemical utilization of wheat and peas

and other surpluses seems certain of development in the years ahead. Already wheat and potato farmers in Washington own a plant at Wenatchee that makes syrup from wheat and potatoes. A new and larger plant, to be owned by farmers in Washington, Idaho, and Oregon will be built at The Dalles, Oregon. The next ten years should see a considerable development in this and similar types of chemurgic industry.

A chemurgic industry of considerable magnitude potentially is now being sponsored by a group of business men in Moscow, Idaho, who have cooperative leanings. They propose to take wheat and fruit surpluses, and perhaps sawdust, and convert them into various products, the exact determination of products depending on what can be most profitably sold. A total of 16 plants are visioned for the entire Columbia River Basin. Each plant would employ 20 men throughout the year and 25 women for nine months of the year and would be cooperatively-owned by individual farmers, by cooperatives that supply the wheat and other surpluses, by cooperatives that market the finished products, and by the permanent employees, who it is hoped will be veterans. It is proposed to locate two of the 16 plants in the area of the Association, the exact location depending on the availability of power, water, and rail service. Each plant would consume a minimum of 200 horsepower and a maximum (if power is used for generating heat) of 850 horsepower and would have a load factor of approximately 80 percent. The project is still in a nebulous stage and, therefore, it is included in the "maybe" and not the "probable" class. Further reports on the prospect of its developing may be available soon.

Timber Industries: Timber industries, mainly sawmills, shingle mills, planing mills, dry kilns, tie making plants and pole treating plants, will contribute materially to the industrial loads to be served by the cooperative and will constitute the largest single class of industrial load available to the cooperative.

It is an accepted rule of thumb that sawmill power requirements will approximate one kilowatt for each 100 board feet of rated daily output of the mill. For example: a sawmill having a daily capacity of 25,000 board feet would have a connected load of approximately 250 kilowatts. In estimating the average maximum demand of sawmills in each section, those mills which were known to be considering conversion to electric power within each period of the estimate and those already electrified, were totaled and averaged. An overall diversity factor of 1.7 had been applied to all timber industries in arriving at the demand contribution to over all system demands. Electrified sawmill operation experience indicates that an average of 35 kilowatt hours is required to produce 1000 board feet of lumber. On this basis a sawmill with an output of 25,000 board feet per day would have an average daily power consumption of 875 kilowatt hours. Annual consumption figures are based on an average operating season of 200 days.

The KW demands of shingle mills are likewise estimated at 4.5 kilowatts for each square of daily output and the power consumption is estimated at 7 kilowatt hours per square. These figures are taken from the experience records of actual installations. Annual power consumption is based on the mills

operating 200 days per year, which is average for this area.

Planing mill demands have been estimated on the basis of 1 kilowatt of capacity being required for each 400 board feet of daily output. Power consumption has been estimated at 10 kilowatt hours for each 1000 board feet processed.

Dry kiln demand estimates were obtained from the operators themselves. The kiln at Ahashka to be operated in conjunction with the sawmill is expected to have a total of 12 units requiring 20 kilowatts each. Estimates of power consumption are based on the assumption that an average of 30% of the connected load will operate continuously 24 hours per day, 200 days per season.

Pole treating plant demands are based on a required capacity of 2 kilowatts per pole output and power consumption is conservatively estimated at 5 kwh per pole output.

The demand of the Tie Making Plant at Fernwood was furnished by the operator. Since consumption estimates were not readily available from experience, a load factor equal to other timber industries was applied in arriving at the estimated power consumption.

The demand and consumption of the Forest Service Maintenance Shop south of Clarkia was obtained from the Forest Supervisor.

Timbered areas exists in four of the six delivery sections, and a total of 10,100 installed horsepower at sawmills, shingle mills, planing mills, dry kilns, tie mills and pole yards, is listed as actual or potential load. Not listed as potential load, but which have prospects of development, are wood products

industries, including a pulp and paper mill. They will be mentioned later.

The situation in each delivery area is as follows:

Delivery Area A - Juliaetta. None. This is primarily a farming area. Farm load and agricultural industrial load is all that is definitely foreseen, though a few sawmills with short-lived timber supplies may develop.

Delivery Area B - Orofino - This is a heavily-wooded area which is expected to support the present rate of mill operations for at least five years. The permanent sustained yield rate of operation will be high but not as high as the present rates. Potlatch Forests, Inc., which operates one of the largest mills in the country in Lewiston, probably obtains a majority of its logs from this area. In addition to its large operation, there are numerous small and medium-size mills many of which it is expected the cooperative will serve. All of those listed below are expected to last for at least five years. After that period, it is reasonable to expect some reduction in the number of mills served especially in the area between Weippe and Orofino. It is difficult to say which mills have the best chance of survival, but as mill operation declines in this section, agricultural load will increase. The soil is high grade and will support prosperous agriculture. This section (between Weippe and Orofino) is one of two in the project area that the Soil Conservation Service recommends for agricultural development. In sections not suited to agriculture, timber operations are expected to continue indefinitely. It is correct to assume that three-phase service built into the area to serve sawmills wil continue indefinitely to serve them, and

wood products industries that may develop in the years ahead or will serve agriculture that develops in the wake of timber operations.

Name	Address	Type of Operation	Estimated Installed Horsepower*
Musselshell Lumber Co.	Musselshell, Ida.	Sawmill	500 1/
Carl Nelson	Musselshell, Ida.	"	200 1/
Schmidt Bros.	Weippe, Idaho	"	600 1/
Vanderpool & Peterson	Weippe, Idaho	"	200 1/
H. Johnson	Weippe, Idaho	"	200 1/
L. Cardiff	Pierce, Idaho	"	600 1/
H. Krumsick	Orofino, Idaho	"	150 1/**
Steve Russell	Weippe, Idaho	"	150 1/
White Pine Lumber (1)	Orofino, Idaho	"	500 1/
White Pine Lumber (2)	Orofino, Idaho	"	500 1/
L. L. Spafford	Grangemont, Idaho	"	200 1/
Johnson Bros.	Grangemont, Idaho	"	500 1/
J. C. Young	Ahashka, Idaho	"	100 2/
J. C. Young	Ahashka, Idaho	Kiln	240 2/
J. C. Young	Weippe, Idaho	Sawmill	100 2/
J. C. Young	Weippe, Idaho	Kiln	60 2/
Coeur d' Alene	Weippe, Idaho	Sawmill	150 2/
Hutchins Bros.	Weippe, Idaho	Planer	75 2/
	TOTAL		5,275 hp

1/ Data furnished by Dave Kyle, Asst. Superintendent of Clearwater National Forest. Consists of mills which timber supply of five years or longer in present locations.

2/ Data furnished by Association manager. Obtained by dividing the estimated daily production in thousands of board feet by 100.

** According to latest information, this may develop into a band mill, planing mill, and kiln drying operation with power requirements of 700-800 hp.

* Obtained by dividing the estimated daily production in thousands of board feet by 100.

Delivery Area C - North - There is an urgent demand for power in this area. Three mills are now connected for small amounts of power. The present overloaded condition of the system does not permit a delivery of the full amount of power requested. As quickly as additional power is available there

will be a rapid increase in power used by mills. It is believed that some of the land now covered by timber in this area will gradually be converted to agriculture. A small section of the St. Joe National Forest is located in the area. This of course will remain in timber. It cannot be said with as much assurance in this area as in the Orofino area that mill operations will continue indefinitely or be succeeded by agriculture. All operations listed below are considered good for at least five years. Should mill operations fall off during the latter part of the forecast period, the power would be available for other uses. The area is important agriculturally and the new wood products plants, utilizing wood wastes and secondary species, are apt to take root in this area as in the other timbered areas. It is an area of both agricultural and timber resources and abundant power facilities are needed.

The present and potential mill load is as follows:

Name	Address	Type of Operation	Estimated Installed Horsepower *
Connected			
Fox Sawmill	Tensed, Idaho	Sawmill	100 hp 2/
Hamburg Sawmill	Harvard, Idaho	"	40 hp 2/
Dennison Bros.	Harvard, Idaho	"	85 hp 2/
Potential			
Cloyd Boone	Palouse, Wash.	"	250 hp 3/
T. H. Evans & Son	Harvard, Idaho	"	100 hp 3/
Leuty & Isbell	DeSmet, Idaho	"	100 hp 3/
Alva Strong	Garfield, Wash.	"	150 hp 3/
N. I. Kirk	Garfield, Wash.	"	200 hp 3/
Triangle Sawmill	Tensed, Idaho	"	100 hp 2/
Charles Schovaers	Tensed, Idaho	"	100 hp 2/
TOTAL			1,225 hp

2/ Data furnished by Association Manager.
3/ Data furnished by C. E. Powell, Ranger Station, St. Joe National Forest, Princeton, Idaho. Consists of mills with timber supply of 5 years or longer.

* Obtained by dividing the estimated daily production in thousands of board feet by 100.

Delivery Area D - Fernwood. This area is mostly non-agricultural and will remain so. Its economy is primarily lumber and secondarily mining. The mills now in operation represent the minimum number that the cooperative is likely to serve. The resources are sufficient to support additional sawmills, shingle mills and pole yards. It is also a likely area for wood products plants making use of wood wastes and secondary species. The timber supply is ample and a branch of the Milwaukee Railroad serves the area. The availability of adequate power will stimulate the timber and mining activities to new levels of prosperity.

The following operations are considered the minimum requirements of the area:

Name	Address	Type of Operation	Estimated Installed Horsepower
Bracket & Thiebault	St. Maries, Ida.	Sawmill	350 hp 4/
New Mill	St. Maries, Ida.	"	150 hp 4/
New Mill	Emida, Idaho	"	200 hp 4/
L. D. Dennison	Fernwood, Idaho	Shingle Mill	150 hp 4/
Chambers Creek Lum. Co.	Fernwood, Idaho	Tie Mill	250 hp 2/
Harris Sawmill	Fernwood, Idaho	Sawmill	200 hp 4/
Anderson & Carlson	Fernwood, Idaho	"	250 hp 4/
Carney Pole Co.	Spokane, Wash.	Pole Yard	100 hp 4/
Triangle Lumber Co.	Santa, Idaho	Sawmill	100 hp 2/
Forest Service Blister Rust Shop	Clarkia, Idaho	Repair Shop	100 hp 2/
New Mill	Emida, Idaho	Sawmill	100 hp 2/
Norman McCall	Fernwood, Idaho	"	150 hp 2/
	TOTAL		2,100 hp

2/ Data furnished by Association Manager.
4/ Data furnished by R. R. Fitting, Superintendent of St. Joe National Forest. Mills with timber supply of 5 years or longer.

Elk River is the site of a potential mill of large size. Mr. C. E. Powell of the Forest Service at Princeton stated that a 50,000 board feet a day mill was certain to be established there. Elk River is served by a municipal system which owns both the distribution systems and the 22 KV line that extends from Elk River to Bovil, where it connects with the Washington Water Power line of the same voltage. Also at Flk River, the Diamond Match Company has recently acquired 300 million board feet of white pine in the area east of the town. Other species may bring the total to 500 million. The timber is now being cut and taken to the Milwaukee Railroad at Elk River. It is then shipped to a Diamond mill at Cusick in Pend Oreille County in northest Washington, where it is cut into matchstock. The company is considering whether to establish a mill at Elk River and do the cutting there or to continue the present practice of freighting the logs to Cusick. Should they decide to establish a mill at Elk River a minimum of 1,000 horsepower would be required. This potential operation together with the other potential operation of 500 hp at Elk River makes a total of 1,500 horsepower that may be required at that point. It is of no interest to the cooperative unless the Elk River system can be acquired. Should that be possible, and the attitude of the town on the matter is not known, a large addition to the cooperative's power needs would result .

Delivery Area E - Jacques Spur. The timber in this area is beyond the reach of the cooperative's lines and its power requirements are mainly for farming and agricultural industries. Some power is required for limestone operations and they are

listed in the section of this report on Mining Industries.

Delivery Area F - Anatone. In this section now served by the cooperative, there is no timber but it is proposed to extend the lines southward to the Grande Ronde Valley in Oregon and beyond. At Troy, Oregon, a medium-size saw-planing-drying mill is now being built. It has requested a power rate on 715 horsepower with an ultimate requirement of 850 horsepower. The directors of the cooperative have expressed a desire to separate Delivery Area "F" from the cooperative and make a new cooperative of it. But for purposes of this study, it is included in the cooperative area.

The mill load potential is as follows:

Name	Address	Type of Operation	Estimated Installed Horsepower *
Troy Pine Mills	Troy, Oregon	Kiln, Planing Mill and Sawmill	850 hp 6/
W. W. Moore	Troy, Oregon	Sawmill	100 hp 7/
Troy Lumber Co.	Clarkston, Wash.	Sawmill	150 hp 7/
C. H. Neal	Troy, Oregon	Sawmill	150 hp 7/
Arthur Knight	Troy, Oregon	Sawmill	250 hp 8/
		TOTAL	1,500 hp

6/ Data furnished by A. V. Smith, Manager of mill.
7/ Data furnished by Carl Ewing, Superintendent Umatilla National Forest.
8/ Data furnished by Walter Teal, Troy, Oregon.
* Obtained by dividing the estimated daily production in thousands of board feet by 100.

The 10,100 horsepower listed for timber industries in delivery areas B, C, D, and F represent what is considered likely load, load that probably will convert from diesel or steam power to electric power when electric power in adequate amounts is available. The use of electric power in sawmills is rapidly gaining headway all over the Pacific Northwest. It is more

economical and safer than other forms of power. Only the largest mills are apt to cling to steam power, mills that use steam for kiln drying. And even with them, electric power is being used to speed up the drying process by blowing steamed air through kilns. The small and medium-sized mill of any permanence is a sure prospect for electric power.

Mining Industries. The project area has a scattering of reasonably assured mining loads and a large potential of other possible but not too probable loads. The reasonably assured loads would serve garnet mining and limerock processing. A limerock quarry load is now served by the cooperative's lines. The project area has magnesite deposits, ceramic clays, aluminum clays, silica deposits, iron oxide, lignite and large high grade limerock deposits, but the possibility of development cannot be forecast accurately.

The reasonably assured mining loads are as follows:

Name	Address	Type of Operation	Estimated Installed Horsepower
Garnet Mines, Inc.	Fernwood, Idaho	Garnet Mining	75 hp 2/
(Garnet Mine)	Fernwood, Idaho	Garnet Mining	75 hp 2/
Idaho Garnet & Abras.Co.	Fernwood, Idaho	Garnet Mining	50 hp 2/
(Garnet Mine)	Clarkia, Idaho	Garnet Mining	75 hp 2/
*Lewiston Limestone Quarry	Lewiston, Idaho	Limestone Mining	225 hp 2/
Lewiston Limestone Quarry	Lewiston, Idaho	Lime Processing	250 hp 2/
	TOTAL		750 hp

2/ Data furnished by Association's Manager.
* Now served by Association.

Demands for the Garnet Mines and allied enterprise in the Fernwood area were obtained from the operators. There are three

mines and one machine shop the average demand of which are determined and an overall diversity factor of 1.7 applied. Estimated consumption was determined by applying a 20 percent load factor using the resultant demand of 41 kw as a basis for estimating.

Demands and consumption estimates for quarry operators now being served were obtained from the cooperative records. Estimated demands and consumptions were obtained from the operators of the quarry.

Other Industries:

Airway Beacons: Empire Air Lines has been operating unscheduled flights from Boise through Lewiston to Couer d'Alene for the last few years. The company has recently been granted the right to operate interstate from Boise to Walla Walla to Lewiston, thence north to Couer d'Alene and Spokane. The establishment of scheduled flights will result in the establishment of a CAA marked course including the installation of airway beacons and a beam sending station. It is the consensus that the beam sending station will be located at the Lewiston airport, however, numerous beacons will be installed at points along the lines where the cooperative could offer service. It is anticipated that flights will be scheduled from Lewiston, Idaho to Missoula, Montana in the near future making additional beacons available to receive service from the cooperative lines.

Airports (Small): Due to post war emphasis on private and commercial aviation it is probable that present emergency landing fields of the Forest Service will be utilized for commercial and private flying and that small repair shop facilities as

well as boundary and landing lights will be installed. The municipalities of Anatone, Tensed, and Weippe are planning to operate municipal airports on a small scale. Two Forest Service fields, one at Clarkia and one at Emida, together with the municipal fields will be served from the cooperative lines.

Radio Stations: The University of Idaho at Moscow is planning to install a small F. M. radio station transmitter on Moscow Mountain. It is probable that this station will be in operation not later than 1951 and will in all probability be served by the cooperative. In view of recent developments in F. M. radio transmission it is probable that other stations will be established in the area, however, no others are included in the load estimates.

Airport, beacon and radio station demands and consumption are based on the actual experience of other cooperatives serving similar loads.

Fish Hatchery: The cooperative is now serving the State Fish Hatchery at Anatone. At present the power requirements are small, but will be increased by the addition of a 3 kw refrigeration load and a water pump.

State Game Farm: The State Game Farm at Lapwai is now served by the cooperative through a 15 KVA transformer which is fully loaded during the brooding season. This establishment is constantly expanding their facilities and it is anticipated that its power requirements will be almost doubled within the next 10 years.

Street Lighting: The cooperative is now furnishing central station service to numerous unincorporated villages, a few of

which have street lighting systems. It is probable that others will be added to the list of street lighting consumers during the period of estimates.

Street lighting systems were presumed to average six 300 watt lamps burning an average of 10 hours per night, 365 nights per year.

Prospective Industries:

In this category are trends and potentials that are not reasonably sure of development but which may develop. They may be regarded as reserves; if some of the principal potential load does not materialize, one of these may.

One of the largest of the prospective loads is a paper pulp plant at Ahsahka, Idaho on the Clearwater River. At that point the North Fork of the Clearwater River joins tha main stream, and it is considered a likely spot for a pulp mill by officials of the Clearwater National Forest. It is one of them who suggested that a mill might be erected there within 10 years. A pulp and paper mill of the minimum economic size (50 tons per 24 hours), should it materialize, would have a demand of approximately 2300 KW.

"Evansville", the name given for the purposes of this report, to a long narrow strip of land on the north bank of the Snake River a short distance below Lewiston, has distinct industrial and commercial possibilities. It contains about 2000 acres. The Camas Prairie Railroad now borders the strip at the river bank, and within the next ten years slack water transportation should also be available. Better roads into the area and a highway bridge across the Snake River opposite it would

give the area the opportunity of developing into an industrial and commercial section larger than that of Lewiston. No estimate of power requirements for the area has been made except for irrigation. Irrigation and general farm service may be a means of bringing electric service into Evansville and thus be on the ground to serve the larger loads when they develop.

Rogersburg, the name given to the site where the Grande Ronde River joins the Snake River, is another area considered by many as having very large industrial potential. Rogersburg is located up the river from Lewiston, a distance of 25 miles. It has no rail service, no slack water transportation and no power service. At Rogersburg are large limerock deposits of exceptional purity. It would make an ideal site for a large cement mill and no doubt one would be in operation there if power and rail service were available. It has been estimated that the lime deposits would support a 200,000 barrel plant and that the power requirements would be 2400 horsepower. With a long series of dams projected for the Snake and the Columbia Rivers in the years ahead, a cement plant at Rogersburg would seem to be inevitable.

Other potential industries are also possible at Rogersburg. Molybdenum, iron oxide, gold and copper are found in the area. Large deposits of silica and ceramic clay exist in areas very close to Rogersburg. There is a possibility of a glass factory there when the construction of a nearby dam on the Snake River makes possible an absolutely uninterrupted source of power for heat.

The Rogersburg area is separated by difficult terrain from

the main body of the cooperative and the board of directors has expressed a willingness to have it and the existing and proposed lines in Delivery Area "F" separated from Idaho 10 Nez Perce and made into a new cooperative. This proposal and the potential situation as already outlined suggests the desirability of keeping close watch on developments leading to the establishment of industries there, regarding proposed dam construction and its inherent developmental activity within the area as one of the possible industries.

Another potential industry that is likely to develop most anywhere in the Association's area is that of utilizing wood wastes and little used species of wood. In April 1946, a wood products clinic, the first of its kind in the Northwest, was held in Spokane, Washington. Its purpose was to explore possible utilization of wood wastes and secondary species. Mr. E. E. Hubert, wood technologist with I. F. Laucks, Inc., a subsidiary of Monsanto Chemical Company, originated the clinic. In a bulletin prepared by him and issued by his company, he visions the following utilization projects:

"The cutting of little used species, such as lodgepole pine, cotton wood, aspen, true firs, hemlock, etc., which grow in sufficient quantities adjacent to the agricultrual areas and are accessible to truck roads and railroads, can be made into profitable utilization projects by means of economic and effective preservative treatments, and by the use of glues in the manufacture of glued-up products. Such products could result in establishing processing plants, such as wood preservative unit, a small sawmill or a woodworking plant, or if the

economics warrant, all three. The successful establishment of such plants, under a system of timber harvesting which would insure continuous operation, would serve to utilize otherwise unused timber, would furnish useful products for the farm and mine, and would add to the welfare of the community by creating new industry and employment." (From Bulletin No. WA-1-1145 of I. F. Laucks, Inc.) Also in the same bulletin is this statement:

"The opportunities for applying the gluing process to the wood products used in agriculture are many. One of the most promising appears in the manufacture of a large variety of wooden containers for food products; large boxes for storage cellar use, vegetable or fruit crates and boxes, specialty product containers such as for prize potatoes, shipping boxes for dehydrated products, light weight containers for perishable products to be shipped over airlines, sliced wood glued into baskets and crates, lug boxes for canneries, butter, cheese and egg boxes, poultry and many others."

These quotations open up distinct possibilities for a considerable number of small rural and small town industries, but no attempt was made to appraise their power potentials. But there is little doubt that many of the developments visioned by Mr. Hubert will come true during the forecast period.

Acquisitions:

As stated elsewhere in the report (Other Utilities) the only other utilities operating within the cooperative area are the Washington Water Power Company, the village of Elk River (municipal), and the Pierce Light and Power Company.

Information secured recently from the owners of the Pierce Light and Power Company indicated that they were unable to render adequate service with existing generating units and had therefore entered into a 10 year contract with the Washington Water Power Company for the purchase of not more than 200 kilowatts of electric energy from the Washington Water Power Company's 66 KV transmission line now being constructed from Orofine.

The system serves approximately 150 residential and 37 commercial and small power consumers. The maximum demand, as well as could be determined, now approaches 80 kilowatts and is expected to reach 100 kilowatts this winter. No accurate records are available; however, the owners stated that the annual sales for 1945 were approximately 200,000 kilowatt hours, not including about 20 percent losses which would make the gross energy requirements approximately 250,000 kilowatt hours.

The cooperative is anxious to acquire this system which would place it in a position to electrify the rural area north and west of Pierce. It is anticipated that the cooperative will successfully negotiate the purchase of this property by the end of 1948. For purposes of estimating, the demand in 1948 is placed at 100 kilowatts and increased to 150 kilowatts and 225 kilowatts in 1951 and 1956, respectively. Consumption has been estimated on the basis of a 40 percent load factor for all three periods.

The village of Elk River owns and operates a municipal electric distribution system serving 2 farms, 90 residential and 25 commercial consumers. This village is the railhead for

the Chicago, Milwaukee and St. Paul Railroad branch into the area. The Diamond Match Company has recently constructed a machine shop having a maximum demand of approximately 75 kilowatts. The maximum demand on the city distribution system is also about 75 kilowatts. The village council has not considered selling to the cooperative but the idea may be acceptable and advantageous to the town. The acquisition of Elk River would serve as justification for the extension of the cooperative's lines into more thinly populated areas but has not been included in the load estimates.

ESTIMATED ULTIMATE SYSTEM INVESTMENT

In order to arrive at a fair basis on which a long range rate structure may be considered it is necessary to arrive at an approximation of the total ultimate system investment which the cooperative will be obliged to make to construct the necessary facilities to serve the estimated loads.

A general plan of development has been been set forth by which all of the estimated loads will be served from six proposed substations requiring the construction by the cooperative of approximately 40 miles of sub-transmission line (33 KV) and 2 substations. A certain amount of rephasing and reconductoring will also be necessary as will the construction of some new tie lines and rearrangement of existing circuits in order to integrate the system with the proposed new sources of supply. A reasonable estimate of the total number of miles of line may be arrived at on a density basis, to which should be added the independent line mileage necessary to serve isolated 3-phase loads and irrigation pumps, etc.

Tables VIII to XIII, inclusive, indicate that a total of 6560 consumers of all types will be served by the cooperative within ten years. Of this number 5178 are rural consumers (farm and small commercial), 1161 non-farm or village, 110 irrigation pumps and 111 miscellaneous industries. The cooperative is now serving a total of approximately 2860 consumers and operates approximately 1300 miles of line, reflecting an overall consumer density of approximately 2.2 per mile. This is estimated to be broken down at 20 village consumers per mile

and 1.82 farms per mile. The fulfillment of area coverage plans of the cooperative is expected to result in an overall consumer density of approximately 1.7 for rural consumers, exclusive of large isolated 3-phase loads and 20.0 for village consumers.

On the above basis, the following tabulation reflecting total ultimate miles of line is made:

Rural consumers (farms & small commercial)	$\frac{5178}{1.7}$ =	3046 miles
Non-farm (village consumers)	$\frac{1161}{20}$ =	58 miles
Irrigation pumps (.2 mile each) 110 x .2	=	22 miles
Isolated industrial loads	=	24 miles
Sub-Total		3150 miles
Plus miscellaneous (Approx. 1%)	=	32 miles
Grand Total		3182 miles

A significant percentage of this mileage will be comprised of 3-phase and V-phase line in order to insure adequate service to large industrial consumers and to assure proper voltage regulation and balance on each section of the system. Map mileages as shown on work maps were roughly scaled in order to arrive at an approximation of the miles of three-phase and V-phase lines. Services were estimated at 150 feet each. The balance was assumed to be single phase line. The following breakdown is based on the foregoing:

Three-phase line	370 miles
V-phase line	130 miles
Single-phase line	2496 miles
Services	186 miles
Total distribution lines	3182 miles

The tentative ultimate system as contemplated by the cooperative includes the construction of two-33KV/12.5 KV substations

TABLE VII

Type of Line	Existing Lines			Future Lines			Ultimate Lines		
	Miles	Unit Cost	Total	Miles	Unit Cost	Total	Miles	Av. Unit Cost	Total
3 phase	127	$1400	$177,800	243	$1820	$ 442,260	370	$1675	$ 620,060
V phase	75	1000	75,000	55	1300	71,500	130	1127	146,500
1 phase	1017	800	813,600	1479	1040	1,538,160	2496	945	2,351,760
Services	81	900	72,900	105	1170	122,850	186	1052	195,750
							3182	$1040	$3,314,070
Cost of rephasing and reconductoring (lump sum)									75,930
Total distribution lines									$3,390,000

Transmission line, 80 mi. @ $3750	$300,000	
Substations 3000 KVA 33/12.5 KV, 4@ $12,500	50,000	
Meters 6560 @ $15	98,400	
Office furniture & fixtures (including equipment)	9,600	
Transportation equipment	20,000	
Office building (including land) complete	60,000	
Laboratory testing equipment	3,000	
Tools & equipment	10,000	
Communication equipment	5,000	
Inventory of materials	37,000	
Total		$ 593,000
Total physical plant		$3,983,000

General Overhead	
Organization expense (6560 memb. @$5)	$ 32,800
Misc. construction expense 2%	79,660
Engineering & supervision 5%	199,150
Legal expense 1%	39,830
Interest during construction 2%	79,660
Taxes during construction (approx. 2%)	78,900
Total General Overhead	$ 510,000
Grand total investment	$4,493,000

and approximately 40 miles of 33 KV sub-transmission line by the cooperative. Other facilities required to supply adequate supplies of power at 12.5 KV to each of the sections designated "A", "B", "C", "E" and "F" are presumed to be furnished by the Bonneville Power Administration. Estimates contained herein are necessarily preliminary and are subject to revision and change which may be occasioned by the final picture dictated by the System Design Study being prepared by the Project Engineer. New loads not now included in the estimate may also materialize and necessitate the delivery of power to points other than those tentatively designated. For the foregoing reasons an additional 40 miles of 33 KV sub-transmission line and 2 substations are being included in the estimates of ultimate system investment.

The estimated ultimate cost of distribution line is dependent upon the original cost of existing facilities and the present day cost of facilities to be constructed. The following table of costs (Table VII) is based on the cost of existing lines when constructed and the anticipated cost of future construction. The project manager has estimated that lines now being constructed will cost approximately 30 percent more than the cost of original lines.

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TABLE VIII
ESTIMATE OF LOADS
DELIVERY POINT "A" – JULIAETTE

TYPE OF CONSUMER	NO. OF CONSUMERS			KILOWATT DEMAND			KILOWATT HOUR CONSUMPTION		
	1948	1951	1956	1948	1951	1956	1948	1951	1956
Rural Consumers (Farms & Small Commercial)	1,150	1,462	1,774	@ 0.7 805	@ 1.3 1,901	@ 2.0 3,548	@ 2,340 2,691,000	@ 4,788 7,000,056	@ 7,692 13,645,608
Non-Farm (Villages)	166	194	221	@ 0.58 96	@ 1.08 210	@ 1.58 349	@ 1,572 260,952	@ 3,228 626,232	@ 5,184 1,145,664
House Heating	16	45	84	@ 11/1.5D.F. 117	@ 11/1.5D.F. 329	@ 11/1.5D.F. 613	@17,500 280,000	@17,500 787,500	@17,500 1,470,000
Irrigation (Av. 30 Acre units, 7½ H.P. 6kw Dem. div. factor 0–50 – 1.43 51–100 – 1.67, Over 100 – 2.0)	10	20	30	@ 6/1.43D.F. 42*	@ 6/1.43D.F. 84*	@ 6/1.43D.F. 126*	@ 6,000 60,000	@ 6,000 120,000	@ 6,000 180,000
Grain Elevators		1	1		@ 75/2.0D.F. 38	@ 75/2.0D.F. 38		@50,000 50,000	@50,000 50,000
Seed Warehouses	2	2	2	@ 55/2.0D.F. 55	@ 75/2.0D.F. 75	@ 75/2.0D.F. 75	@34,000 68,000	@50,000 100,000	@50,000 100,000
Locker Plants		1	1		@ 10/2.0D.F. 5	@ 10/2.0D.F. 5		@10,000 10,000	@10,000 10,000
Pea Viners		1	1		@120/1.5D.F. 80	@120/1.5D.F. 80		@57,600 57,600	@57,600 57,600
Beacons (Airway)	2	2	2	@ 2/2.0D.F. 2	@ 2/2.0D.F. 2	@ 2/2.0D.F. 2	@ 7,000 14,000	@ 7,000 14,000	@ 7,000 14,000
Radio Stations		1	1		@ 10/1.0D.F. 10	@ 10/1.0D.F. 10		@83,000 83,000	@83,000 83,000
State Game Farm	1	1	1	@ 15/1.5D.F. 10	@ 15/1.5D.F. 10	@ 25/1.5D.F. 17	@25,000 25,000	@25,000 25,000	@40,000 40,000
Totals				1,085	2,660	4,737	3,398,952	8,873,388	16,795,872
Plus System Losses							@20% 849,738	@18% 1,947,817	@16% 3,199,214
System Totals				1,085	2,660	4,737	4,248,690	10,821,205	19,995,086

* Not included in the totals. Demands marked by asterisk occur at different season than house heating when highest demands occur.

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TABLE IX
ESTIMATE OF LOADS
DELIVERY POINT "B" – OROFINO

TYPE OF CONSUMER	NO. OF CONSUMERS			KILOWATT DEMAND			KILOWATT HOUR CONSUMPTION		
	1948	1951	1956	1948	1951	1956	1948	1951	1956
Rural Consumers (Farms & Small Commercial)	665	785	904	@ 0.53 352	@ 1.0 785	@ 1.55 1,401	@ 1,740 1,157,100	@ 3,564 2,797,740	@ 5,724 5,174,496
Non-Farm (Villages)	369	402	435	@ 0.41 151	@ 0.73 293	@ 1.09 474	@ 1,080 398,520	@ 2,220 892,440	@ 3,564 1,550,340
House Heating	12	30	53	@ 11/1.5D.F. 88	@ 11/1.5D.F. 219	@ 11/1.5D.F. 387	@ 17,500 210,000	@ 17,500 525,000	@ 17,500 927,500
Grain Elevators	1	1	1	@ 45/2.0D.F. 23	@ 75/2.0D.F. 38	@ 75/2.0D.F. 38	@ 29,500 29,500	@ 50,000 50,000	@ 50,000 50,000
Seed Warehouses		1	1		@ 75/2.0D.F. 38	@ 75/2.0D.F. 38		@ 50,000 50,000	@ 50,000 50,000
Flour Mill	1	1	1	@ 10/2.0D.F. 5	@ 20/2.0D.F. 10	@ 20/2.0D.F. 10	@ 10,000 10,000	@ 20,000 20,000	@ 20,000 20,000
Locker Plants	2	3	4	@ 5/2.0D.F. 5	@ 10/2.0D.F. 15	@ 10/2.0D.F. 20	@ 6,000 12,000	@ 10,000 30,000	@ 10,000 40,000
Sawmills	4	9	15	@ 290/1.7D.F. 680	@ 290/1.7D.F. 1,530	@ 290/1.7D.F. 2,550	@ 203,000 812,000	@ 203,000 1,827,000	@ 203,000 3,045,000
Planing Mill	1	1	1	@ 75/1.7D.F. 44	@ 75/1.7D.F. 44	@ 75/1.7D.F. 44	@ 60,000 60,000	@ 60,000 60,000	@ 60,000 60,000
Dry Kilns (Lumber)	1	2	2	@ 150/1.3D.F. 115	@ 150/1.3D.F. 230	@ 150/1.3D.F. 230	@ 216,000 216,000	@ 216,000 216,000	@ 216,000 216,000
Beacons (Airway)			2			@ 2/2.0D.F. 2			@ 7,000 14,000
Airport (Small)	1	1	1	@ 5/2.0D.F. 3	@ 5/2.0D.F. 3	@ 5/2.0D.F. 3	@ 10,000 10,000	@ 10,000 10,000	@ 10,000 10,000
Street Lighting Systems Acquisition of Pierce	2	3	3	@ 2/2D.F. 2 100	@ 2/2.0D.F. 3 150	@ 2/2.0D.F. 3 225	@ 6,570 13,140 350,400	@ 6,570 19,710 525,600	@ 6,570 19,710 788,400
Totals				1,568	3,358	5,425	3,278,660	7,239,490	12,181,446
Plus System Losses							@ 20% 819,665	@ 18% 1,589,156	@ 16% 2,320,275
System Total				1,568	3,358	5,425	4,098,325	8,828,646	14,501,721

IDAHO 10 NEZ PERCE

TABLE X
ESTIMATE OF LOADS
DELIVERY POINT "C" – NORTH

TYPE OF CONSUMER	NO. OF CONSUMERS			KILOWATT DEMAND			KILOWATT HOUR CONSUMPTION		
	1948	1951	1956	1948	1951	1956	1948	1951	1956
Rural Consumers (Farms & Small Commercial)	622	877	1,133	@ 0.67 417	@ 1.25 1,096	@ 1.90 2,153	@ 2,196 1,365,912	@ 4,488 3,935,976	@ 7,212 8,171,196
Non-Farm (Villages)	116	134	152	@ 0.60 70	@ 1.12 150	@ 1.64 249	@ 1,452 168,432	@ 2,964 397,176	@ 4,764 724,128
House Heating	9	27	54	@ 11/1.5D.F. 66	@ 11/1.5D.F. 197	@ 11/1.5D.F. 394	@ 17,500 157,500	@ 17,500 472,500	@ 17,500 945,000
Grain Elevators	3	3	3	@ 15/2.0D.F. 23	@ 40/2.0D.F. 60	@ 40/2.0D.F. 60	@ 10,000 30,000	@ 26,300 78,900	@ 26,300 78,900
Locker Plants	1	2	3	@ 5/2.0D.F. 3	@ 10/2.0D.F. 10	@ 10/2.0D.F. 15	@ 6,000 6,000	@ 10,000 20,000	@ 10,000 30,000
Sawmills	5	8	10	@ 115/1.7D.F. 340	@ 125/1.7D.F. 588	@ 125/1.7D.F. 725	@ 80,500 402,500	@ 87,500 700,000	@ 87,500 875,000
Beacons (Airway)	1	1	1	@ 2/2.0D.F. 1	@ 2/2.0D.F. 1	@ 2/2.5D.F. 1	@ 7,000 7,000	@ 7,000 7,000	@ 7,000 7,000
Airports (Small)		1	1		@ 5/2.0D.F. 3	@ 5/2.0D.F. 3		@ 10,000 10,000	@ 10,000 10,000
Street Lighting Systems	1	1	1	@ 2/2.0D.F. 1	@ 2/2.0D.F. 1	@ 2/2.0D.F. 1	@ 6,570 6,570	@ 6,570 6,570	@ 6,570 6,570
Totals				921	2,106	3,601	2,143,914	5,628,122	10,847,794
Plus System Losses							@ 20% 535,979	@ 18% 1,235,441	@ 16% 2,066,246
System Totals				921	2,106	3,601	2,679,893	6,863,563	12,914,040

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TABLE XI
ESTIMATE OF LOADS
DELIVERY POINT "D" – FERNWOOD

TYPE OF CONSUMER	NO. OF CONSUMERS			KILOWATT DEMAND			KILOWATT HOUR CONSUMPTION		
	1948	1951	1956	1948	1951	1956	1948	1951	1956
Rural Consumers (Farms & Small Commercial)	95	149	203	@ 0.78 74	@ 1.34 200	@ 2.02 410	@ 1,884 178,980	@ 3,864 575,736	@ 6,204 1,259,412
Non-Farm (Villages)	189	206	223	@ 0.45 85	@ 1.11 229	@ 1.23 274	@ 1,116 210,924	@ 2,292 472,152	@ 3,684 821,532
House Heating	3	10	18	@ 11/1.5D.F. 23	@ 11/1.5D.F. 73	@ 11/1.5D.F. 131	@ 17,500 52,500	@ 17,500 175,000	@ 17,500 315,000
Locker Plants	1	2	3	@ 5/2.0D.F. 3	@ 10/2.0D.F. 10	@ 10/2.0D.F. 15	@ 6,000 6,000	@ 10,000 20,000	@ 10,000 30,000
Sawmills	3	5	8	@ 190/1.7D.F. 335	@ 190/1.7D.F. 559	@ 190/1.7D.F. 894	@ 133,000 399,000	@ 133,000 665,000	@ 133,000 1,064,000
Shingle Mill	1	2	4	@ 150/1.7D.F. 88	@ 150/1.7D.F. 176	@ 150/1.7D.F. 352	@ 46,800 46,800	@ 46,800 93,600	@ 46,800 187,200
Tie (R.R.) Manufacturing & Loading	1	1	1	@ 250/1.7D.F. 147	@ 250/1.7D.F. 147	@ 250/1.7D.F. 147	@ 171,800 171,800	@ 171,800 171,800	@ 171,800 171,800
Pole Treating Plant	1	1	2	@ 25/1.7D.F. 15	@ 200/1.7D.F. 118	@ 200/1.7D.F. 235	@ 15,000 15,000	@ 100,000 100,000	@ 100,000 200,000
Forest Service Shops	1	1	1	@ 100/2.0D.F. 50	@ 100/2.0D.F. 50	@ 100/2.0D.F. 50	@ 60,000 60,000	@ 60,000 60,000	@ 60,000 60,000
Mining (Garnet)	2	3	4	@ 70/1.7D.F. 82	@ 70/1.7D.F. 123	@ 70/1.7D.F. 164	@ 71,800 143,600	@ 71,800 215,400	@ 71,800 287,200
Airports (Small)			2			@ 5/2.0D.F. 5			@ 10,000 20,000
Street Lighting System	1	1	1	@ 2/2.0D.F. 1	@ 2/2.0D.F. 1	@ 2/2.0D.F. 1	@ 6,570 6,570	@ 6,570 6,570	@ 6,570 6,570
Totals				903	1,686	2,678	1,291,174	2,555,258	4,422,714
Plus System Losses							@ 20% 322,794	@ 18% 560,910	@ 16% 842,422
System Totals				903	1,686	2,678	1,613,968	3,116,168	5,265,136

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TABLE XII
ESTIMATE OF LOADS
DELIVERY POINT "E" – JACQUES SPUR

TYPE OF CONSUMER	NO. OF CONSUMERS			KILOWATT DEMAND			KILOWATT HOUR CONSUMPTION		
	1948	1951	1956	1948	1951	1956	1948	1951	1956
Rural Consumers (Farm & Small Commercial)	444	610	775	@ 0.89 395	@ 1.57 958	@ 2.71 2,100	@ 2,856 1,268,064	@ 5,844 3,564,840	@ 9,384 7,272,600
Non-Farm (Villages)	35	39	42	@ 0.82 29	@ 1.52 59	@ 2.33 98	@ 2,028 70,980	@ 4,188 163,332	@ 6,720 282,240
House Heating	7	19	38	@ 11/1.5D.F. 51*	@ 11/1.5D.F. 139*	@ 11/1.5D.F. 277*	@ 17,500 122,500	@ 17,500 332,500	@ 17,500 665,000
Irrigation	10	40	70	@ 6/1.43D.F. 42	@ 6/1.43D.F. 168	@ 6/1.67D.F. 251	@ 6,000 60,000	@ 6,000 240,000	@ 6,000 420,000
Irrigation (District L.O.)	1	1	1	@ 250/1.5D.F. 167	@ 250/1.5D.F. 167	@ 250/1.5D.F. 167	@ 360,000 360,000	@ 360,000 360,000	@ 360,000 360,000
Grain Elevators	2	2	2	@ 25/2.0D.F. 25	@ 75/2.0D.F. 75	@ 75/2.0D.F. 75	@ 16,400 32,800	@ 50,000 100,000	@ 50,000 100,000
Locker Plants		1	1		@ 10/2.0D.F. 5	@ 10/2.0D.F. 5		@ 10,000 10,000	@ 10,000 10,000
Pea Viners	1	2	2	@ 120/1.5D.F. 80	@ 120/1.5D.F. 160	@ 120/1.5D.F. 160	@ 57,600 57,600	@ 57,600 115,200	@ 57,600 115,200
Honey Processing Plant		1	1		@ 20/2.0D.F. 10	@ 20/2.0D.F. 10		@ 13,100 13,100	@ 13,100 13,100
Quarries (Lime Stone) & Burning	1	2	2	@ 225/1.7D.F. 132	@ 250/1.7D.F. 294	@ 250/1.7D.F. 294	@ 30,000 30,000	@ 70,000 140,000	@ 70,000 140,000
Airport (Small)			1			@ 5/2.0D.F. 3			@ 10,000 10,000
Totals				870	1,896	3,163	2,001,944	5,038,972	9,388,140
Plus System Losses							@ 20% 500,486	@ 18% 1,106,116	@ 16% 1,788,217
System Totals				870	1,896	3,163	2,502,430	6,145,088	11,176,357

* Not included in totals. Demands marked by asterisk occur during other than irrigation season when highest demands occur.

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TABLE XIII
ESTIMATE OF LOADS
DELIVERY POINT "F" – ANATONE

TYPE OF CONSUMER	NO. OF CONSUMERS			KILOWATT DEMAND			KILOWATT HOUR CONSUMPTION		
	1948	1951	1956	1948	1951	1956	1948	1951	1956
Rural Consumers (Farms & Small Commercial)	131	260	389	@ 1.07 140	@ 1.88 489	@ 2.83 1,101	@ 2,892 378,852	@ 5,928 1,541,280	@ 9,516 3,701,724
Non-Farm (Villages)	50	69	88	@ 1.00 50	@ 1.81 125	@ 2.73 240	@ 2,124 106,200	@ 4,404 303,876	@ 7,068 621,984
House Heating	2	9	20	@ 11/1.5D.F. 15	@ 11/1.5D.F. 66	@ 11/1.5D.F. 146	@ 17,500 35,000	@ 17,500 157,500	@ 17,500 350,000
Irrigation	4	7	10	@ 6/1.43D.F. 17*	@ 6/1.43D.F. 29*	@ 6/1.43D.F. 42*	@ 6,000 24,000	@ 6,000 42,000	@ 6,000 60,000
Locker Plants	1	2	3	@ 5/2.0D.F. 3	@ 10/2.0D.F. 10	@ 10/2.0D.F. 15	@ 6,000 6,000	@ 10,000 20,000	@ 10,000 30,000
Sawmills		3	5		@ 285/1.7D.F. 504	@ 250/1.7D,F. 735		@ 199,500 598,500	@ 175,000 875,000
Planing Mill		1	1		@ 150/1.7D.F. 88	@ 150/1.7D.F. 88		@ 120,000 120,000	@ 120,000 120,000
Dry Kilns (Lumber)		1	1		@ 100/1.3D.F. 77	@ 200/1.3D.F. 154		@ 144,000 144,000	@ 288,000 288,000
Beacons	1	1	1	@ 2/2.0D.F. 1	@ 2/2.0D.F. 1	@ 2/2.0D.F. 1	@ 7,000 7,000	@ 7,000 7,000	@ 7,000 7,000
Airports (Small)	1	1	1	@ 5/2.0D.F. 3	@ 5/2.0D.F. 3	@ 5/2.0D.F. 3	@ 10,000 10,000	@ 10,000 10,000	@ 10,000 10,000
Fish Hatchery	1	1	1	@ 5/2.0D.F. 3	@ 5/2.0D.F. 3	@ 5/2.0D.F. 3	@ 6,000 6,000	@ 6,000 6,000	@ 6,000 6,000
Street Lighting Systems	1	2	2	@ 2/2.0D.F. 1	@ 2/2.0D.F. 2	@ 2/2.0D.F. 2	@ 6,570 6,570	@ 6,570 13,140	@ 6,570 13,140
Totals				216	1,368	2,488	579,622	2,963,296	6,082,848
Less System Losses							@ 20% 144,906	@ 18% 650,480	@ 16% 1,158,638
System Total				216	1,368	2,488	724,528	3,613,776	7,241,486

* Not included in totals. Demands marked by asterisk occur during other than house heating season when highest demands occur.

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TABLE XIV
SUMMARY OF POWER REQUIREMENTS

LOCATION	KILOWATT DEMAND (MAXIMUM)			KILOWATT HOUR CONSUMPTION			ESTIMATED LOAD FACTOR		
	1948	1951	1956	1948	1951	1956	1948	1951	1956
"A" – JULIAETTA	1,085	2,660	4,737	4,248,690	10,821,205	19,995,086			
"B" – OROFINO	1,568	3,358	5,425	4,098,325	8,828,646	14,501,721			
"C" – NORTH	921	2,106	3,601	2,679,893	6,863,563	12,914,040			
"D" – FERNWOOD	903	1,686	2,678	1,613,968	3,116,168	5,265,136			
"E" – JACQUES SPUR	870	1,896	3,163	2,502,430	6,145,088	11,176,357			
"F" – ANATONE	216	1,368	2,488	724,528	3,613,776	7,241,486			
TOTAL	5,563	13,074	22,092	15,867,834	39,388,446	71,093,826	32.6%	34.4%	36.7%